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PAGE WHITE FARRER

Our ref: 202018/DJW/ac

28 November 2001

Your ref: Y A Akulova 1-4-2

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Attn: Docket Administrator - Patricia Lott
Agere Systems Inc.
Intellectual Property Law
P.O. Box 614
Berkeley Heights, NJ 07922
United States of America

Dear Sirs,

UK Patent Application No. 0100172.6
"Dopant Diffusion Barrier Layer for use in III-V Structures"

Please find enclosed a copy of the Combined Search and Examination Report we have received on the above-identified British patent application. Copies of all of the documents cited in the Search Report are also enclosed.

The deadline for responding to the Examination Report is **7 MAY 2002**.

We have not carried out any review of the search results or the Examination Report at this stage. If you would like us to do so with a view to assisting you in determining an appropriate way to proceed, then please let us know.

In any event we look forward to hearing further from you prior to the due date for responding to the Examination Report.

Yours faithfully,

David J Williams
PAGE WHITE & FARRER

Enc.

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Your Reference: Y.A. AKULOVA 1-4-2
Application No: GB 0100172.6

5 November 2001

Dear Sirs

Patents Act 1977:
Combined Search and Examination Report under Sections 17 and 18(3)

Latest date for reply: 7 May 2002

I enclose two copies of my search and examination report and a copy of the citation.

By the above date you should either file amendments to meet the objections in the report or make observations on them. If you do not, the application may be refused.

Publication

I estimate that, provided you have met all formal requirements, preparations for publication of your application will be completed soon after **4 December 2001**. You will then receive a letter informing you of completion and telling you the publication number and date of publication.

Amendment/withdrawal

If you wish to file amended claims for inclusion with the published application, or to withdraw the application to prevent publication, you must do so before the preparations for publication are completed. **No reminder will be issued.** If you write to the Office less than 3 weeks before the above completion date, please mark your letter prominently: **"URGENT - PUBLICATION IMMINENT"**.

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†**Use of E-mail:** Please note that e-mail should be used for correspondence only.

Yours faithfully

T P Marlow
Examiner

Important information about combined search and examination

I also ask that you take note of the following points. These might have a bearing on the future stages of your application because the examination report has been sent to you before your application has been published.

(a) You may file voluntary amendments before making a full response to my examination report. We will publish with your application any new or amended claims you file voluntarily or as a full response, provided that they are received before preparations for publication are completed. It would help us when you file amendments before publication if you could **prominently indicate** in a covering letter whether or not the amendments are intended as a full response to the examination report.

(b) If you file a full response to the examination report before your application is published I will consider it as soon as possible. However, if this would disrupt the publication of your application, I would have to delay taking any action until the application had been published. This delay could be up to 3 months, depending upon when we receive your response.

(c) There is another situation when there might be a delay between you filing a full response and the Patent Office responding to it. This would arise if you met all my objections but your application had not or had only recently been published. I could not report the outcome of my re-examination until I was satisfied that the search was complete for documents published before the priority date of your invention and that anybody interested in the application has had three months following publication of the application to make observations on the patentability of your invention.

(d) Provided that the requirements of the Act have been met, I can send your application to grant as early as three months after publication. Before doing so I will bring the original search up to date and raise with you any further objection that might result from this top-up search. However, there is a possibility that at that time I may not have access to all the patent applications published after the priority date of your invention and of possible relevance to your application. If this is the case I would have to complete the search after grant and if necessary raise any new found novelty objection then.

Your ref:	Y.A. AKULOVA 1-4-2	**Examiner:**	T P Marlow
Application No:	GB 0100172.6	**Tel:**	01633 813572
Applicant:	Lucent Technologies Inc	**Date of report:**	5 November 2001
Latest date for reply:	7 May 2002	Page 1/2	

Patents Act 1977
Combined Search and Examination Report under Sections 17 & 18(3)

Novelty

1. The invention as defined in claims 1, 2 and 11 is not new because it has already been disclosed in the following document:

WO 97/50133 A1 (PHILIPS) - see barrier (9) composed of sub-layers (9A,9B) between p-doped layer (4) and active layer (3) in semiconductor diode of Fig. 1

2. The PHILIPS document discloses a radiation-emitting semiconductor diode having a barrier (9) between doped layer (4) and active layer (3). The abstract states that the barrier (9) prevents migration of dopants, e.g. zinc atoms, from doped layer (4) to active layer (3). The barrier includes two or more dopant barrier layers (9A,9B), which the table on page 10 shows are undoped, and therefore will not form a pn junction with doped layer (4), thus anticipating claims 1 and 2. Furthermore, Fig. 1 of this document shows the barrier layer (9) as part of a mesa (12) as described from page 6 line 12 to page 7 line 5, showing claim 11 is not new.

Inventive step

3. The invention as defined in claims 4, 8, 16 is obvious in view of what has already been disclosed in the above document.

4. In Fig. 1 of the PHILIPS document, a semiconductor diode has a diffusion barrier (9) between p-doped layer (4) and active layer (3), where the barrier (9) may include two or more layers (9A,9B). It would be obvious to a skilled person that this barrier could be used to prevent diffusion of dopant between a doped layer and a substrate, therefore showing claim 4 lacks an inventive step. In addition, page 11 lines 28 to 30 of this document mention that the semiconductor diode of this invention could be made of other material systems such as GaAs/AlGaAs or InP/InGaAsP. It is therefore obvious to use undoped InAlAs either as the layer (3) adjacent the barrier layer (9) in Fig. 1, or as one of the barrier layers (9A,9B), showing that claims 8 and 16 are obvious.

Clarity and support

5. In claim 1 on line 5 of page 8, it is not completely clear that "a layer" is referring to a layer **additional** to the doped layer and the layers of the dopant barrier. This should be clarified by defining this layer as, for example, "a **further** layer". The term "said layer" in claims 3, 4, 8 and 10 should be similarly amended for consistency of terms

[Examination Report contd.]

between the claims.

6. On page 5 lines 2 to 5 of the description, it is mentioned that undoped semi-insulating InAlAs could be used for the current-blocking barrier layer (106) instead of iron doped InP in Fig. 1, and that in such an embodiment, the n-type InP layer (107) would not be necessary. Omission of the n-type InP layer (107) in Fig. 1 would result in a dopant barrier containing only one layer (108), which would fall outside the scope of the claims which require at least two layers making up the dopant barrier. Amendment is therefore required to resolve this inconsistency between the description and claims.

7. The final paragraph on page 8 of the description obscures the scope of the invention and should be either be deleted or amended so it clearly relates the scope of the invention to that defined by the claims.

Application No: GB 0100172.6
Claims searched: 1 to 20
Examiner: T P Marlow
Date of search: 2 November 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): H1K: (KKAX)

Int Cl (Ed.7): H01L H01S

Other: ONLINE: WPI, EPODOC, JAPIO, INSPEC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	WO 97/50133 A1	PHILIPS - see barrier (9) composed of sub-layers (9A,9B) between p-doped layer (4) and active layer (3) in semiconductor diode of Fig. 1	1,2,4, 8, 11,16

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.